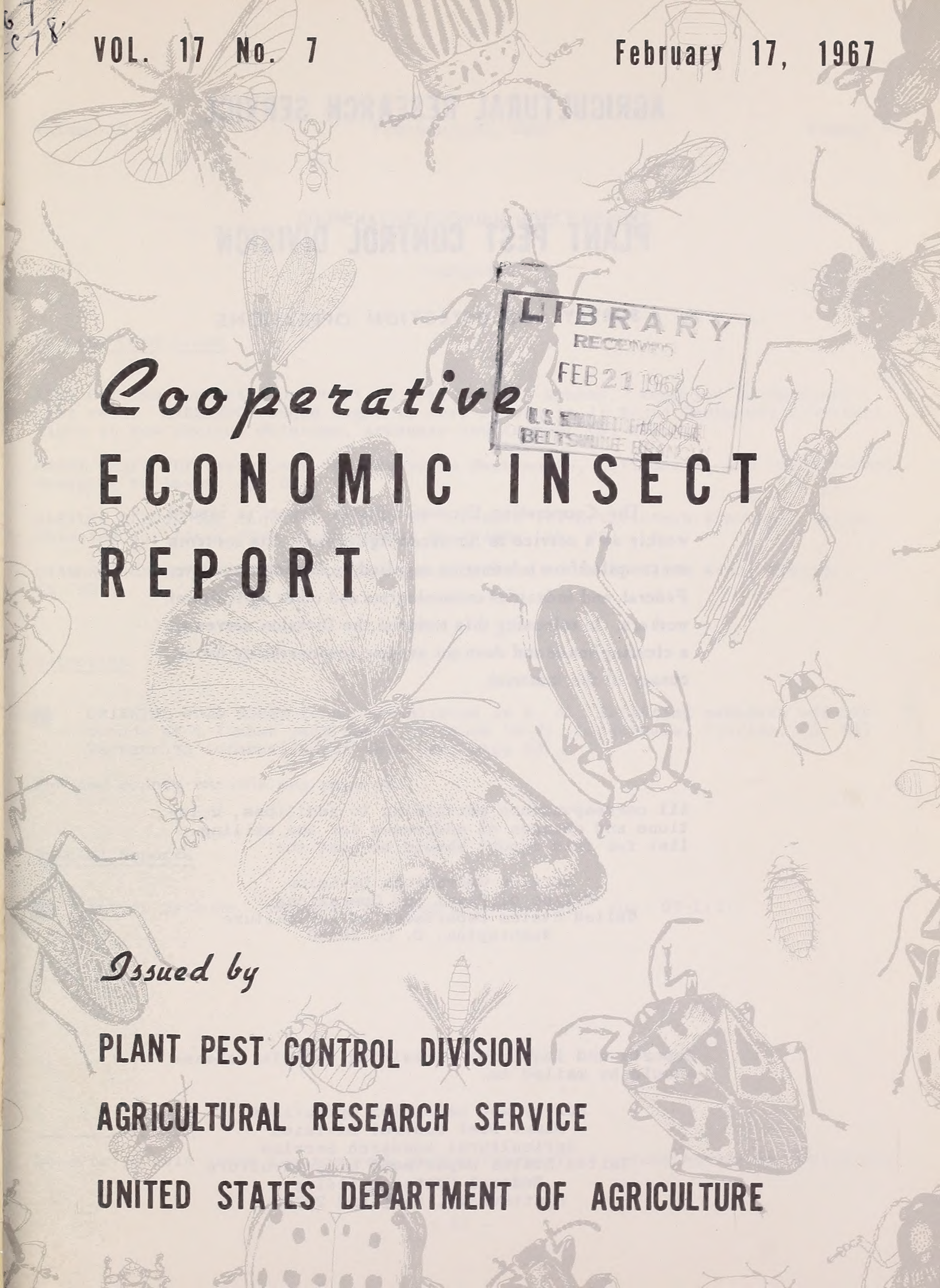
Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

67
c78



VOL. 17 No. 7

February 17, 1967

LIBRARY
RECEIVED
FEB 21 1967
U.S. DEPT. OF AGRICULTURE
BELTSVILLE BRANCH

Cooperative ECONOMIC INSECT REPORT

Issued by

PLANT PEST CONTROL DIVISION
AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearing house and does not assume responsibility for accuracy of the material.

All correspondence pertaining to additions, deletions and changes of addresses for the mailing list for this report should be sent to:

Service Operations Division
Office of Plant and Operations
United States Department of Agriculture
Washington, D. C. 20250

Reports and inquiries pertaining to this release should be mailed to:

Survey and Detection Operations
Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture
Federal Center Building
Hyattsville, Maryland 20782

Volume 17 February 17, 1967 Number 7

COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

ARMY CUTWORM appearing on wheat in Ford County, Kansas. Reported in Oklahoma last week. GREENBUG ranged light to very severe in 11 Texas Panhandle counties; light in New Mexico, Oklahoma, Arkansas and Kansas. (p. 89).

RANGE CRANE FLY larvae are very heavy in Sacramento, California, and could become damaging to lawns. (p. 89).

ALFALFA WEEVIL egg counts continue to increase in northeastern Arkansas; larvae detected for first time in northwest Louisiana. (p. 90).

DIAMONDBACK MOTH larvae damaging wild crucifers in Belle Glade area, Florida. (p. 90).

Detection

● ORIENTAL WOOD BORER found established in U. S. Infesting mahogany and oak boards at a lumber yard and a millwork in Ft. Lauderdale, Florida. (p. 94). Background information on this pest page 95.

For new county records see page 94.

Special Reports

● Survey Methods. Selected References 1965-1966. (pp. 97-112).

Reports in this issue are for week ending February 10 unless otherwise indicated.

CONTENTS

Special Insects of Regional Significance....89

Insects Affecting

Corn, Sorghum, Sugarcane....89
Small Grains....89
Turf, Pastures, Rangeland....89
Forage Legumes....90
Sugarbeets....90
Potatoes, Tomatoes, Peppers....90
Cole Crops....90
Deciduous Fruits and Nuts....91
Citrus....91
Small Fruits....91
Ornamentals....92
Forest and Shade Trees....92
Man and Animals....93
Stored Products....93

Federal and State Plant Protection Programs....93

Insect Detection....94

Corrections....94

Light Trap Collections....94

Oriental Wood Borer....95

Hawaii Insect Report....96

Survey Methods. Selected References 1965-1966. Part I....97

WEATHER OF THE WEEK ENDING FEBRUARY 13, 1967

HIGHLIGHTS: Coldest week of the season in parts of the East. Worst blizzard in 12 months in the Northeast. Fifth warm week in northern Rockies.

PRECIPITATION: Generous rains fell over the Gulf States early in the week (about 7 inches in the New Orleans area Monday) while snow in the southern Appalachians spread northward to the Ohio River Valley and northeastward to New England. By Tuesday, a major blizzard was crippling the eastern seaboard, with 12-18 inches of snow from Maryland to southern New England and 6-8 inches farther north. Snow removal in New York City alone cost $3.5 million. A second storm dumped heavy snow over portions of the East on Thursday, with up to 9 inches or more in the Piedmont of North Carolina, 5-13 inches in coastal portions of Virginia, Maryland, Delaware and New Jersey, and 2-3 inches farther north along the coast. Fortunately many large metropolitan areas escaped the heavy snow falls of this second storm; Washington, Baltimore, Philadelphia, New York, and Boston receiving only 2-3 inches. Trenton, New Jersey, with 16.9 inches, reported the snowiest week of the season. Scattered light snow also fell over the northern and central Rockies, the northern Great Plains, and the Great Lakes region on several days. Central and southern California were dry after three wet weeks. Except for coastal Washington and Oregon, very little precipitation fell west of the Rockies or in central Great Plains from Kansas to the lower Ohio River Valley. It was the sixth dry week in New Mexico.

Weather continued on page 96.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

ARMY CUTWORM (*Chorizagrotis auxiliaris*) - KANSAS - Very light in wheat in Ford County field. (Simpson).

CORN EARWORM (*Heliothis zea*) - ARIZONA - Light on some sorghum at Yuma Valley, Yuma County. (Ariz. Coop. Sur.).

GREENBUG (*Schizaphis graminum*) - NEW MEXICO - Light on wheat in Chaves County. (Mathews). TEXAS - Averaged 0-10 per foot of row in 13 fields and as high as 68 per foot in one field in Wise, Montague and Cooke Counties. (Turney, Stafford). Survey conducted in 11 panhandle counties indicated aphids were mostly in irrigated wheat. Less than 5 per linear foot of row in Lubbock County to 1,500 per linear foot in one Swisher County field. Damage evident in Swisher County. Ranged 0-100 per linear foot in Potter, Hale, Castro and Crosby Counties. Ranged 25-1,000 per foot in 5 counties. Averaged 1,000 per linear foot in large border area of wheat field in Randolph County. (Daniels). ARKANSAS - Low but increasing slightly in northwestern area. (Boyer). OKLAHOMA - Counts per linear foot on wheat ranged 10-50 near Altus, Jackson County; 1-10 in Cotton, Greer and Tillman Counties. Light in Blaine and Caddo Counties. (Okla. Coop. Sur.). KANSAS - Occasional aphid found on wheat in few south-central area fields; none found in southwest district. (Simpson).

CORN LEAF APHID (*Rhopalosiphum maidis*) - NEW MEXICO - Very light on barley in Dona Ana County. (Campbell). ARIZONA - Light to moderate on sorghum in Yuma County, light in Maricopa County. Slight increases on barley noted in both counties. (Ariz. Coop. Sur.).

SPOTTED ALFALFA APHID (*Therioaphis maculata*) - KANSAS - None found in any alfalfa checked in southwest or south-central area. (Simpson).

CORN, SORGHUM, SUGARCANE

DESERT CORN FLEA BEETLE (*Chaetocnema ectypa*) - ARIZONA - Adults moderate on sorghum in Maricopa County. (Ariz. Coop. Sur.).

SMALL GRAINS

WINTER GRAIN MITE (*Penthaleus major*) - TEXAS - Survey of 14 small grain fields in Denton, Wise, Montague, and Cooke Counties indicated mites averaged 0-10 per foot of row in 9 fields, 10-25 and above in 5 fields. (Turney, Stafford). OKLAHOMA - Damaging numbers on wheat in Porter area, Wagoner County. Ranged 40-50 per linear foot in Tillman and Cotton Counties. (Okla. Coop. Sur.).

BROWN WHEAT MITE (*Petrobia latens*) - OKLAHOMA - Ranged 50-500 per linear foot on wheat in Cotton, Tillman, and Kiowa Counties; moderate in Caddo County. Controls initiated in some areas but may not be warranted due to prevalent drought. (Okla. Coop. Sur.).

ENGLISH GRAIN APHID (*Macrosiphum avenae*) - MISSISSIPPI - Adults and nymphs light on wheat in Carroll County. (Dinkins). ARKANSAS - Remains low on wheat in northwestern area. (Boyer).

TURF, PASTURES, RANGELAND

A CHINCH BUG (*Blissus insularis*) - TEXAS - Moderate in several lawns of St. Augustine grass at Austin, Travis County. Early activity probably due to unseasonably warm weather. (Thompson).

RANGE CRANE FLY (*Tipula simplex*) - CALIFORNIA - Larvae heavy in rain gutters along concrete apron of freeway in Sacramento, Sacramento County. Crane flies appearing in several areas as result of more than normal rainfall. Continued wet weather may result in damaging infestations in turf. (Cal. Coop. Rpt.).

FORAGE LEGUMES

ALFALFA WEEVIL (*Hypera postica*) - LOUISIANA - First and second-stage larvae collected for first time from alfalfa at Bossier City, Bossier Parish, February 5, 1967. Infestation comparatively light, but feeding damage apparent. Previously known to occur only in eastern section of State. (Newsom). MISSISSIPPI - Increasing in northern counties; larvae 30-90 per square foot in several fields. (Dinkins). ARKANSAS - Egg counts in northeast area continue to increase; 562 eggs per square foot found in one sample which is equivalent to more than 24 million eggs per acre. A few second-stage larvae also recovered from stems. (Miner). PENNSYLVANIA - Collected in several homes in Fulton and Centre Counties during fall 1966. (Udine).

CLOVER LEAF WEEVIL (*Hypera punctata*) - ARKANSAS - Larvae continue low on legumes in northwestern area. (Boyer).

EGYPTIAN ALFALFA WEEVIL (*Hypera brunneipennis*) - ARIZONA - Larvae increasing on alfalfa in Yuma and Maricopa Counties; terminal damage moderate. (Ariz. Coop. Sur.).

PEA APHID (*Acyrthosiphon pisum*) - NEW MEXICO - Light to medium on alfalfa in Chaves and Eddy Counties. (Mathews). OKLAHOMA - Averaged 10 per square foot of crown area in Jackson County alfalfa. (Okla. Coop. Sur.). ARKANSAS - Low on legumes in northwestern area. (Boyer). KANSAS - Light, 0-10 per square foot, in few south-central alfalfa fields. (Simpson).

SUGARBEETS

DESERT CORN FLEA BEETLE (*Chaetocnema ectypa*) - ARIZONA - Adults moderate on sugarbeets in Maricopa County. (Ariz. Coop. Sur.).

BEET ARMYWORM (*Spodoptera exigua*) - ARIZONA - Continued light to moderate on most sugarbeets in Maricopa and Pinal Counties. (Ariz. Coop. Sur.).

GREEN PEACH APHID (*Myzus persicae*) - ARIZONA - Light to moderate on sugarbeets in Maricopa and Pinal Counties. (Ariz. Coop. Sur.).

POTATOES, TOMATOES, PEPPERS

SEED-CORN MAGGOT (*Hylemya platura*) - ARKANSAS - Damaged tomato seed in hotbeds in southeast area. (Roberts).

COLE CROPS

VEGETABLE WEEVIL (*Listroderes costirostris obliquus*) - FLORIDA - Larvae severely infested mustard at Winter Garden, Orange County. (Ware).

CABBAGE LOOPER (*Trichoplusia ni*) - FLORIDA - Larvae moderate on untreated crucifers at Belle Glade, Palm Beach County. (Genung).

DIAMONDBACK MOTH (*Plutella xylostella*) - FLORIDA - Larvae common on wild crucifers in Belle Glade area; will probably damage commercial crucifers. (Genung).

DECIDUOUS FRUITS AND NUTS

ARMORED SCALES - FLORIDA - All stages of *Aspidiotus perniciosus* moderate on 20 percent of 1,000 pear plants in nursery at Glen St. Mary, Baker County. (Collins, Jan. 30). ALABAMA - *Pseudaulacaspis pentagona* heavy in 3-year-old peach orchard of several acres; 4 trees dead. (Futral).

PEACH TREE BORER (*Sanninoidea exitiosa*) - ALABAMA - Larvae light to medium in many commercial peach orchards in Chilton County. Large amounts of gum deposit observed below ground line on trees in several home orchards in Lee County. Recent summer-like weather favored feeding by late-stage larvae, producing excessive gum residue. (Futral et al.). MARYLAND - Larvae killed 15 of 200 young peach trees in St. Marys County. (U. Md., Ent. Dept.).

CITRUS

Citrus Insect Situation in Florida - End of January - CITRUS RUST MITE (*Phyllocoptruta oleivora*) infested 70 percent of groves (norm 59 percent); 50 percent economic (norm 41 percent). Population much above average and in high range and will continue high with 25-30 percent of groves having heavy infestations. Highest districts west, south, north and central. CITRUS RED MITE (*Panonychus citri*) infested 51 percent of groves (norm 33 percent); 24 percent economic (norm 10 percent). Population in moderate range but much above average January level of recent years. Further increase expected. Highest districts west and north. TEXAS CITRUS MITE (*Eutetranychus banksi*) infested 44 percent of groves (norm 27 percent); 18 percent economic (norm 10 percent). This mite is in moderate range and above normal abundance for January. Slight increase expected. Highest districts west and north. SIX-SPOTTED MITE (*Eotetranychus sexmaculatus*) is below average abundance and very scarce. GLOVER SCALE (*Lepidosaphes gloverii*) infested 81 percent of groves; 16 percent economic. Population above normal and approaching high range with further increase expected. Highest districts central, east and south. PURPLE SCALE (*L. beckii*) infested 79 percent of groves; 4 percent economic. Population near normal and moderate with little change expected. Highest district central. YELLOW SCALE (*Aonidiella citrina*) infested 68 percent of groves; 14 percent economic. Population above normal and in moderate range; increase expected. Highest districts central and east. CHAFF SCALE (*Parlatoria pergandii*) infested 57 percent of groves; 4 percent economic. Below average abundance and currently in low range; increase expected. Highest district east. BLACK SCALE (*Saissetia oleae*) infested 37 percent of groves; 16 percent economic. Population near normal low level for January; increase expected. Highest district central. WHITEFLIES are near average abundance; increase expected. (W. A. Simanton (Citrus Expt. Sta., Lake Alfred, Fla.)).

AN ARMORED SCALE (*Unaspis citri*) - FLORIDA - Infested up to 27 percent of sweet orange plants in nurseries in Lake, Orange and Hendry Counties. (Simpson et al., Feb. 2).

CALIFORNIA RED SCALE (*Aonidiella aurantii*) - ARIZONA - Detected on backyard lemon tree in Yuma. (Ariz. Coop. Sur.).

SMALL FRUITS

A WEEVIL (*Notolomus basalis*) - FLORIDA - Adults of this species and *Diachus auratus* (a flea beetle) infested 30 percent of 100 blackberry plants at Groveland, Lake County. Assumed to be feeding on pollen, but damage not definite. (Henderson).

BROWN SOFT SCALE (*Coccus hesperidum*)- FLORIDA - Adults infested 50 percent of 100 blackberry plants at Homeland, Polk County. (Schmidt, Feb. 2).

ORNAMENTALS

A WEEVIL (*Artipus floridanus*) - FLORIDA - Adults infested 150 jungleflame ixora (*Ixora coccinea*) at Hollywood, Broward County. (Hickman, Cervone, Feb. 3).

PINK SCAVENGER CATERPILLAR (*Sathrobrota rileyi*) - CALIFORNIA - Larvae medium and boring in stems of bamboo nursery stock in Fallbrook, San Diego County. (Cal. Coop. Rpt.).

PEACH TREE BORER (*Sanninoidea exitiosa*) - ALABAMA - Larvae severely damaged several flowering peach shrubs in Lee County. (McQueen).

WHITEFLIES - ALABAMA - Nymphs extremely heavy, 100 per leaf, on all gardenia plants examined in Lee, Elmore and Montgomery Counties. (McQueen). CALIFORNIA - *Trialeurodes vaporariorum* medium on *Eucalyptus citradora* nursery stock in Pasadena, Los Angeles County. (Cal. Coop. Rpt.).

APHIDS - MARYLAND - *Myzus persicae* alates heavy on pansies in Berwyn Heights, Prince Georges County. (U. Md., Ent. Dept.). FLORIDA - Adults of *M. persicae* infested 50 percent of 500 chrysanthemums in nursery at Tampa, Hillsborough County. (Barber, Jan. 24). *Aphis gossypii* adults infesting 80 percent of 400 hibiscus plants in nursery at Clarcona, Orange County. (Ware, Feb. 3). NEW MEXICO - *Cinara* species medium to heavy on arborvitae in Las Cruces; honeydew covered sidewalks. ARIZONA - *Macrosiphoniella sanborni* heavy on ornamentals in yards throughout Yuma, Yuma County. (Ariz. Coop. Sur.).

ARMORED SCALES - FLORIDA - *Odonaspis penicillata* adults moderate on 100 bamboo nursery plants at Largo, Pinellas County. (Bingaman, McFarlin, Feb. 2). *Chrysomphalus aonidum* severe on ivy at nursery in Apopka, Orange County. (Musgrove, Jan. 24). All stages of *Fiorinia theae* severe on 50 percent of holly nursery plants at Titusville, Brevard County. (Levan, Feb. 3).

PEA LEAF MINER (*Liriomyza bryoniae*) - CALIFORNIA - Larvae and pupae medium in leaves of chrysanthemum nursery stock in Leucadia, San Diego County, and light to medium in asters at Lomita, Los Angeles County. (Cal. Coop. Rpt.).

BOXWOOD LEAF MINER (*Monarthropalpus buxi*) - ALABAMA - Larvae heavy on several hundred English boxwood plants at Birmingham, Jefferson County; spreading to nearby boxwood plants. This leaf miner has not been reported in State during past 4 years. (Gates, Thornhill).

SOUTHERN FIRE ANT (*Solenopsis xyloni*) - CALIFORNIA - Adults medium to heavy on limbs and trunks of juniper nursery stock in Vista, San Diego County. (Cal. Coop. Rpt.).

SPIDER MITES - FLORIDA - *Tetranychus yusti* adults infested 269 datura plants at nursery in Dade City, Pasco County. (Williams). ARKANSAS - *Oligonychus ilicis* infested holly in northwest Washington County. (Roberts).

FOREST AND SHADE TREES

EASTERN TENT CATERPILLAR (*Malacosoma americanum*) - FLORIDA - Eggs hatching on wild plum and wild black cherry at Gainesville, Alachua County. (Hetrick, Feb. 1).

NANTUCKET PINE TIP MOTH (*Rhyacionia frustrana*) - ALABAMA - Numerous pupae overwintering in 50 percent of loblolly and shortleaf pine tips that were damaged last year. No moths observed emerging at this time. (McQueen).

BLACK TURPENTINE BEETLE (*Dendroctonus terebrans*) - ALABAMA - In a few large loblolly pines at Lee County, late-stage larvae and few adults were slightly active and feeding in galleries in cambium layer below ground. (McQueen).

MAN AND ANIMALS

MOSQUITOES - LOUISIANA - Larvae collected in Jefferson Parish were *Aedes triseriatus*, *A. sollicitans*, *A. vexans*, *Anopheles quadrimaculatus*, *Culex restuans*, *C. salinarius* and *Culiseta inornata*. *Aedes sollicitans* and *A. vexans* increasing while *C. inornata* declined. Adults averaged 7.7 per night in 20 light traps. (Stokes). TEXAS - During January, flights of *Aedes sollicitans* and *Culex salinarius* occurred in Jefferson County. *Culiseta inornata* was also present. *A. sollicitans* noted flying after dark with temperatures of 48°F. (Thompson).

COMMON CATTLE GRUB (*Hypoderma lineatum*) - ALABAMA - Late-stage larvae light to medium in back and groin areas of 60 percent of slaughter cattle in Sumter County. Many have cut exit holes and entered soil for pupation. (Lashley). OKLAHOMA - Ranged 0-12 per head on steers in Noble and Payne Counties. Heavy on untreated cattle in Marshall County. Continued moderate in Mayes County. (Okla. Coop. Sur.).

SCREW-WORM (*Cochliomyia hominivorax*) - Single case reported in U. S. February 5-11 was in Jim Hogg County, Texas. Total of 75 cases reported in portion of Barrier Zone in Republic of Mexico January 29-February 4 as follows: Territorio sur de Baja California 26, Sonora 46, Chihuahua 1, Nuevo Leon 2. No cases were reported from Mexico south of Barrier Zone. Barrier Zone is area where eradication operations are underway to prevent establishment of self-sustaining population in U. S. Sterile screw-worm flies released February 5-11: Texas 20,688,000, Mexico 89,282,000. (Anim. Health Div.).

CATTLE BITING LOUSE (*Bovicola bovis*) - OKLAHOMA - Low numbers infested 10 percent of steers in Payne County. (Okla. Coop. Sur.).

SHORT-NOSED CATTLE LOUSE (*Haematopinus eurysternus*) - OKLAHOMA - Averaged 1 per hair part on steers in Payne County. (Okla. Coop. Sur.).

HOG LOUSE (*Haematopinus suis*) - OKLAHOMA - Heavy on hogs in Marshall County and moderate in Mayes County. (Okla. Coop. Sur.).

TICKS - CALIFORNIA - Ticks appeared early in January and numbers increased progressively. *Dermacentor occidentalis* reported on dogs and livestock with few on man. Livestock being treated in Amador, Calaveras, El Dorado and Nevada Counties. No paralysis reported in domestic animals, but few deer paralyzed. Recovery rapid after treatment. Tick counts on deer as high as 10 per square inch of hide; none occurred on head or ears. (Cal. Coop. Rpt.). OKLAHOMA - Annual tick survey on white-tailed deer in eastern half of State completed. Of 3,472 ticks checked, 85.19 percent were *Ixodes scapularis*, 12.85 percent *Dermacentor albipictus*, 1.93 percent *Amblyomma americanum* and 0.03 percent *A. maculatum*. (Okla. Coop. Sur.). PENNSYLVANIA - *Dermacentor albipictus* heavy on deer in Union, Franklin and Centre Counties during winter. Det. by R. J. Snetsinger. (Shaw et al.).

STORED PRODUCTS

INDIAN-MEAL MOTH (*Plodia interpunctella*) - NEW MEXICO - Moderately damaged sacks of hegari at Hatch, Dona Ana County. (Hare).

CONFUSED FLOUR BEETLE (*Tribolium confusum*) - NEW MEXICO - Light on sacked barley and hegari at Hatch, Dona Ana County. (Hare).

BLACK CARPET BEETLE (*Attagenus piceus*) - NEW MEXICO - Infestation general on old sacks and debris at Hatch, Dona Ana County. (Hare).

FEDERAL & STATE PLANT PROTECTION PROGRAMS

GRASSHOPPERS - OKLAHOMA - At 18 grassland locations in Craig, Delaware and Mayes Counties, egg pods averaged 0.25 per square foot of sod; averaged 0.6 at 11 locations in Cotton, Greer, Jackson and Jefferson Counties. Most egg pods in good condition. All counts made where adult populations were economic in late summer adult survey. (Okla. Coop. Sur.).

PINK BOLLWORM (*Pectinophora gossypiella*) - NEW MEXICO - Of cocoons located on cotton stalks 1-3 inches below ground, 70-80 percent survived cold weather in Chaves and Eddy Counties. (Mathews, Judd, Bartholf).

BEET LEAFHOPPER (*Circulifer tenellus*) - CALIFORNIA - Spraying of winter annual host plants initiated in Kings, Fresno, Merced, San Joaquin and Alameda Counties. Over 11,000 acres treated; post-spray checks indicated excellent kill of leafhoppers. Cold weather interrupting egg-laying. (Cal. Coop. Rpt.).

CARIBBEAN FRUIT FLY (*Anastrepha suspensa*) - FLORIDA - Single larva collected from calamondin at St. Petersburg, Pinellas County; 7 larvae collected from guava at Sarasota, Sarasota County. Few adults caught in McPhail traps in these 2 cities. (Carroll, Frederick, Hiatt, Feb. 3).

ORIENTAL WOOD BORER (*Heterobostrychus aequalis* (Waterhouse)) - FLORIDA - Heavy infestations found in individual oak and mahogany boards at a lumber yard and a millwork in Ft. Lauderdale. Specimens first submitted in January. Subsequent surveys show adults, pupae and larvae present. Determined by R. E. Woodruff and T. J. Spilman. Intensified inspection of lumber and installation of black light traps have been initiated. Although this important pest has been intercepted or found on shipments of wood products from oriental countries on several occasions, this is the first evidence of an established infestation in the U. S. (Fla. Coop. Sur. and PPC). For background report, see page 95.

INSECT DETECTION

New United States Record

ORIENTAL WOOD BORER (*Heterobostrychus aequalis* (Waterhouse)) - FLORIDA - Collected from oak and mahogany boards at Ft. Lauderdale during January and February, 1967. Det. by R. E. Woodruff and T. J. Spilman. (p. 94).

New Parish Record

ALFALFA WEEVIL (*Hypera postica*) - LOUISIANA - Larvae collected at Bossier City, Bossier Parish, February 5, 1967. (p. 90).

CORRECTIONS

CEIR 17(5):63 - INSECT DETECTION - PINK BOLLWORM (Pectinophora gossipiella) - MEXICO - Should read "Collected from gin trash at Caborca and *Hermosillo*, Sonora. (p. 62).

CEIR 17(5):64 - GENERAL VEGETABLES - Line 9: Dacus curcubitae should read Dacus cucurbitae.

CEIR 17(6):81 - LIGHT TRAP COLLECTIONS - Last line: Spodoptera exiqua should read Spodoptera exigua.

LIGHT TRAP COLLECTIONS

FLORIDA - Gainesville, 2/8, 1 BL - Black cutworm (*Agrotis ipsilon*) 1, granulate cutworm (*Feltia subterranea*) 1, armyworm (*Pseudaletia unipuncta*) 1. TEXAS - Brownsville, 1/28-2/3, 2 BL, temp. 40-79°, precip. 0.02 - Black cutworm 55, salt-marsh caterpillar (*Estigmene acrea*) 6, granulate cutworm 66, tobacco budworm (*Heliothis virescens*) 1, corn earworm (*H. zea*) 13, variegated cutworm (*Peridroma saucia*) 4, yellow-striped armyworm (*Prodenia ornithogalli*) 76, armyworm 27, cabbage looper (*Trichoplusia ni*) 2.

ORIENTAL WOOD BORER (Heterobostrychus aequalis (Waterhouse))

Economic Importance - The most common of the larger bostrichids boring in packing cases, boxes, chests, plywood, sapwood in furniture, and sal rafters of thatched bungalows in India is H. aequalis. It is frequently a pest of wood manufacturing industries. Adults bore through 1-2 inches of wood and even may make holes in the lead lining of boxes. When logs are severely attacked, the wood is reduced to a powder to a depth of 2-3 inches. Damage may extend deeper in soft woods, but in hard woods, it may be confined to the sapwood. The species, intercepted frequently in United States quarantine, mostly in wood packing cases, is now reported in Florida. See page 94.

Distribution - Burma, Ceylon, Cuba, India, Indonesia, Malagasy Republic, New Guinea, Philippine Republic, southeast Asia and Surinam. United States: Florida.

Hosts - Recorded from wood of more than 35 species of trees including mahogany, bamboo, sal (Shorea robusta), semul and para rubbertree. Mahogany and oak in Florida.

Life History and Habits - In India, the eggs are deposited on rough surfaces of sawed timber, logs, in holes, cracks or short tunnels made by the female in the wood. The larval tunnel may be one-quarter inch wide and extend 10-12 inches. As a rule, it is winding and tightly packed with undigested residue of wood eaten by the larvae. This fine dust in the tunnels is characteristic of the genus. Tunnels of pinhole and shothole borers contain no residue. Pupation occurs in a cell at the end of the tunnel. The adult remains in the wood for a variable period, then emerges through an exit hole, usually from June to October. At times, beetles will bore through a thickness of 1-2 inches to escape. Development from egg to adult requires a minimum of 1 year but many larvae need 2 or 3 years. A 5-year period was recorded in plywood and 6 years in chests of semul (Bombax malabaricum). In plywood panels, tunnels may be confined to one sheet of plywood by the intervening glued layer.

Description - Adult male - Elongate, cylindrical, uniformly reddish brown to brownish black, moderately shiny. Palpi, antennae and tarsi brownish yellow; dorsal surface of body glabrous. Head much narrower than pronotum. Pronotum widest at middle or posterior angles, strongly deflexed on apical half, arcuately emarginate in front; sides broadly rounded or parallel at middle; dense tubercles on apical half, those on basal half very much flattened to appear like scales on a fish. Wing surface densely, deeply, coarsely punctate, the punctures arranged in more or less distinct rows; each wing cover with two tubercles on apical declivity, the outer one straight, elongate, moderately elevated, inner tubercle long, arcuate, and more or less hooked at apex. Adult female - Differs from male in lack of large, arcuate tubercles on the apical declivity of the wing covers. Length of adult 6-13 mm., width about 3 mm. Length of larva approximately 11 mm.

Selected References:

Beeson, C. F. C. 1935. Indian Forester. pp. 250-255.
Beeson, C. F. C. and Bhatia, B. M. 1937. Indian For. Rec. (n.s. Ent.) 2(12):221-323.
Fisher, W. S. 1950. U.S. Dept. Agr. Misc. Pub. 698:85-87.

HAWAII INSECT REPORT

Vegetables - GREENHOUSE WHITEFLY (Trialeurodes vaporariorum) was medium to heavy on snap beans, tomatoes, eggplant, okra and bell peppers in Nanakuli, Waianae, and Makaha, Oahu. A year-round spray program is necessary in these generally dry lowland areas. Rains occasionally hamper spray operations, thus allowing whitefly populations to build up. (Nakao). GREEN PEACH APHID (Myzus persicae) medium on Chinese cabbage and bell peppers and heavy on eggplants at Kahului, Maui. (Miyahira).

Fruit, Nut and Shade Trees - Heavy outbreak of COCONUT LEAF ROLLER (Hedylepta blackburni) occurred in vicinity of Wailua Beach, Kauai, apparently under control. A parasitic tachina fly numerous and very active. Normally, this leaf roller is held in check by more than 14 species of parasites and predators, but infrequently these are curbed by climatic and other factors, allowing this pest to attain outbreak levels. Coconut leaf roller is one of a few native insects that occasionally attains pest proportions. (Au, Thistle). On Kauai, an ARMORED SCALE (Phenacaspis cockerelli) light to medium on mango trees in Lihue, and heavy on kukui nut trees (Aleurites moluccana) at Puuopae, at 1,500 feet. (Au). A PLATASPID BUG (Coptosoma xanthogramma) heavy on maunaloa vines, sesban and coral trees in windward Oahu from Kaneohe to Kaawa. Apparently spreading northward, as one adult found on sunflower plant in Kahuku. (Funasaki, Krauss).

General Pests - SOUTHERN GREEN STINK BUG (Nezara viridula) caused noticeable damage to macadamia nuts in Kainaliu, Hawaii Island. On Maui, nymphs and adults increasing on wild weed hosts in Kahului; nymphs continue heavy on cheeseweed in Ewa and Pearl City; adults light on tomato and sunflower in Kahuku. On Kauai, trace numbers of nymphs and adults on bean varieties, but none on preferred weed hosts from Lihue to Kekaha. (Yoshioka et al.).

Man and Animals - Total of 553 Aedes vexans nocturnus and 4,265 Culex pipiens quinquefasciatus taken in 47 light traps operated by Mosquito Control Branch, Department of Health, on Oahu during January. Aedes spp. remained low in all areas. Culex spp. were highest in Nanakuli. (Haw. Ins. Rpt.).

Households - An ANT (Tapinoma melanocephalum) heavy in a building in Honolulu, Oahu, and caused considerable annoyance. This species is generally not a pest in dwellings. (Krauss).

Beneficial Insects - Larvae of a NOCTUID MOTH (Hypena strigata) were very heavy on several hundred acres of lantana in Kula area, Maui. (Miyahira).

Weather continued from page 88.

TEMPERATURE: Temperatures averaged above normal from the northern Pacific coast to the Missouri River Valley with the fifth mild week over and west of the northern Rockies. Temperatures averaged well below normal from the Missouri River to the Atlantic and south from Arizona eastward. Bitter cold arctic air blanketed the north-central portion of the Nation with subzero temperatures occurring on several mornings. On Saturday, maximum temperatures over northern Minnesota and nearby portions of North Dakota warmed only to about 10° below zero. Some of the coldest temperatures of the week were -41° at Hibbing, Minnesota, and -39° in the Adirondack Mountains in New York. Subzero temperatures Wednesday reached north-central Missouri and freezing temperatures reached the Gulf of Mexico. Mobile, Alabama, registered 25°. In much of the East, especially the Northeast, this was the coldest week of the season both for weekly averages and lowest minimums. Weekly temperature departures ranged from -12° in northern Minnesota, southern Michigan, Pennsylvania, and southern Mississippi to +15° in northern Montana (Summary supplied by Environmental Data Service, ESSA).

SURVEY METHODS

Selected References 1965 - 1966

Part I

Introduction

To provide a readily available reference source on scientific methods to measure insect populations, literature citations are presented for the years 1965 and 1966. It is believed that these will be helpful in establishing the present status of the work. The subjects covered in this part are population measurement, forecasting, rearing, equipment and techniques, traps, attractants, and pictorial keys. Additional lists will be issued as they are prepared. Separates of this list are available from Survey and Detection Operations.

POPULATION MEASUREMENT

Bibikova, V. A. and Coworkers. 1965. On the method of studying density of populations of fleas of *Rhombomys opimus* Licht. Zool. Zhur. 44(8):1214-1218. In Rus., Engl. Sum.

Blickenstaff, C. C. 1966. Standard survey procedures for the alfalfa weevil. Ent. Soc. Amer. Bul. 12(1):29-30.

Block, W. C. 1965. Distribution of soil mites (Acarina) on the Moor House National Nature Reserve, Westmorland, with notes on their numerical abundance. Pedobiologia 5(3):244-251. Ref.

Boyer, W. P. 1966. Survey method for insects in heads of combine-type grain sorghum. USDA Coop. Econ. Ins. Rpt. 16(23):531-532.

Boyer, W. P., Lincoln, C. and Phillips, J. R. 1966. Surveys for *Heliothis* moths in Arkansas. USDA Coop. Econ. Ins. Rpt. 16(39):951-952.

Brogdon, J. E. and Kerr, S. H. 1965. Home gardener's lawn insect control guide. Fla. Agr. Ext. Serv. Cir. 213B, 15 pp. [Includes survey methods.]

Embree, D. G. and Sisojevic, P. 1965. The bionomics and population density of *Cyzenis albicans* (Fall.) (Tachinidae: Diptera) in Nova Scotia. Canad. Ent. 97(6): 631-639.

Ford, R. P., Talerico, R. L. and Mott, D. G. 1965. A field test of procedures for evaluating and scheduling white-pine weevil control. U.S. Forest Serv. Res. Note NE-37, 4 pp.

Graves, J. B., Clower, D. F., Bagent, J. L. and Bradley, J. R., Jr. 1965. Seasonal occurrence of *Heliothis* larvae on cotton in Louisiana. J. Econ. Ent. 58(6):1152-1153.

Haas, G. E. 1966. A technique for estimating the total number of rodent fleas in cane fields in Hawaii. J. Med. Ent. 2(4):392-394.

Harcourt, D. G. 1966. Sequential sampling for use in control of the cabbage looper on cauliflower. J. Econ. Ent. 59(5):1190-1192.

Harcourt, D. G. 1966. Sequential sampling for the imported cabbageworm, *Pieris rapae* (L.). Canad. Ent. 98(7):741-746.

Hightower, B. G., Davis, R. B. Baumhover, A. H. and Graham, O. H. 1966. Seasonal abundance of the screw-worm in northern Mexico. J. Econ. Ent. 59(2):416-420.

Hodges, J. W., Beshear, R. J. and Beckham, C. M. 1966. Relative seasonal abundance of bollworm and tobacco budworm larvae on cotton in Georgia. J. Econ. Ent. 59(1): 128-131.

Howse, G. M. and Dimond, J. B. 1965. Sampling populations of pine leaf adelgid *Pineus pinifoliae* (Fitch). I. The gall and associated insects. Canad. Ent. 97(9): 952-961. Ref.

Ives, W. G. H. and Warren, G. L. 1965. Sequential sampling for white grubs. Canad. Ent. 97(6):596-604.

Kobayashi, S. 1965. Influence of adult density upon the oviposition site in the cabbage butterfly, *Pieris rapae crucivora*. Jap. J. Ecol. 15(1):35-38. Ref. In Jap., Engl. Sum.

Kulik, I. L. and Petrov, V. G. 1966. Importance of the hosts of ticks in different developmental stages for determination of population density of *Ixodes ricinus* in Chuvashia. Zool. Zhur. 45(1):131-134. In Rus., Engl. Sum.

Lloyd, E. P. and Merkl, M. E. 1966. A field-cage study of population dynamics of the boll weevil. J. Econ. Ent. 59(1):83-86.

Ma, S. C. and Ting, Y. C. 1965. The regulatory mechanism in population fluctuations of the oriental migratory locust. Acta Zool. Sinica 17(3):261-277. Ref. In Chin., Engl. Sum.

Mathys, G. and Vrie, M. Van De. 1965. Comparative study of survey methods for the red spider mite *Panonychus ulmi* Koch. Entomophaga 10(3):265-271. In Fr., Engl. Sum.

Mitchell, E. R. and Mistric, W. J., Jr. 1965. Concepts of population dynamics and estimation of boll weevil populations. J. Econ. Ent. 58(4):757-763.

Miyashita, K. and others. 1965. Population dynamics of the chestnut gall-wasp. *Dryocosmus kuriphilus* Yasumatsu (Hymenoptera: Cynipidae). III. Five year observation on population fluctuations. Jap. J. Appl. Ent. & Zool. 9(1):42-52.

Miyashita, K., Ikeuchi, S. and Kawamura, E. 1965. Studies on the seasonal prevalence of the peach fruit moth, *Carposina niponensis* Walsingham, and chemical control experiments. Hokkaido Nat. Agr. Expt. Sta. Rpt. 68, 92 pp. Ref. In Jap., Engl. Sum.

Pass, B. C. and VanMeter, C. L. 1966. A method for extracting eggs of the alfalfa weevil from stems of alfalfa. J. Econ. Ent. 59(5):1294.

Post, R. L. and McBride, D. K. 1966. Barley thrips biology and control. N. Dak. Ext. Serv. Cir. A-292, 3 pp. [Includes survey methods.]

Powell, D. M. and Landis, B. J. 1965. A comparison of two sampling methods for estimating population trends of thrips and mites on potatoes. J. Econ. Ent. 58(6):1141-1144.

Rickard, W. H. and Haverfield, L. E. 1965. A pitfall trapping survey of darkling beetles in desert steppe vegetation. Ecology 46(6):873-875. [Chiefly *Pelecyphorus densicollis* and *Stenomorpha puncticollis*.]

Schoenburg, R. B. and Little, T. M. 1966. A technique for the statistical sampling of *Fannia* larval densities on poultry ranches. J. Econ. Ent. 59(6):1536-1537.

Shepherd, R. F. 1965. Distribution of attacks by *Dendroctonus ponderosae* Hopk. on *Pinus contorta* Dougl. var. *latifolia* Engelm. Canad. Ent. 97(2):207-215.

Sloan, N. F. and Coppel, H. C. 1965. Population fluctuations of the larch casebearer, *Coleophora laricella* Hbn. in the University Arboretum, Madison, Wisconsin 1962-1964. Forest Res. Notes 122, 3 pp.

Spiller, D. 1965. Methods used for chironomid larva surveys of sewage oxidation ponds and natural waters at Auckland, New Zealand. Calif. Vector Views 12(3):9-15.

Survey and Detection Operations, PPC. 1966. Formosan subterranean termite. Guidelines for survey. USDA Coop. Econ. Ins. Rpt. 16(47):1087-1090. [Compiled from information supplied by PPC Southern Region and U.S. Forest Service.]

Survey and Detection Operations, PPC. 1966. Guidelines for pear sawfly survey. USDA Coop. Econ. Ins. Rpt. 16(12):227.

Symmons, P. M. 1966. Assessing the size of populations of adults of the red locust, *Nomadacris septemfasciata* (Serv.), in their outbreak areas by means of a helicopter. Bul. Ent. Res. 56(4):715-723.

Takai, A., Ito, Y., Nakamura, K., and Miyashita, K. 1965. Estimation of population density of the green rice leafhopper (*Nephotettix cincticeps* Uhler) by the mark-recapture and the sweeping methods. Jap. J. Appl. Ent. & Zool. 9(1):5-12. Ref. In Jap., Engl. Sum.

Terrell, T. T. 1966. Estimating defoliation caused by spruce budworm from undamaged shoots. USDA Coop. Econ. Ins. Rpt. 16(46):1073-1074. [Original appeared as Research Note, No. 86, USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, Utah, October 1961.]

Terrell, T. T. 1966. Spruce budworm survey methods in the northern region. USDA Coop. Econ. Ins. Rpt. 16(46):1071-1072.

Thomas, J. G. and Coworkers. 1966. Texas guide for controlling insects on grain and forage crops. Tex. Agr. Ext. Serv., MP-339, 16 pp. [Includes technique to make greenbug counts.]

Thompson, P. H. and Dicke, R. J. 1965. Sampling studies with *Aedes vexans* and some other Wisconsin *Aedes* (Diptera: Culicidae). Ent. Soc. Amer. Ann. 58(6):927-930.

Wada, Y. 1965. Population studies on Edmonton mosquitoes. Quaestiones Ent. 1(4): 187-222. Ref.

Wolfenbarger, D. A. and Darroch, J. G. 1965. A sequential sampling plan for determining the status of corn earworm control in sweet corn. J. Econ. Ent. 58(4):651-654.

FORECASTING

Boller, E. 1966. Three years of experience in timing-forecast for cherry fly control by soil temperature measurement. Schweiz Z. Obst- Weinbau 102(3):63-67. In Ger.

Buffam, P. E. and Carolin, V. M., Jr. 1966. Determining trends in western spruce budworm egg populations. J. Econ. Ent. 59(6):1442-1444.

Jarvis, J. L. and Brindley, T. A. 1965. Predicting moth flight and oviposition of European corn borer by the use of temperature accumulations. J. Econ. Ent. 58(2):300-302.

Ma, S. C., Ting, Y. C. and Li, T. M. 1965. Study on long-term prediction of locust population fluctuations. Acta Ent. Sinica 16(4):319-338. In Chin., Engl. Sum.

Nishino, M. and Furuhashi, K. 1965. Predicting outbreaks of Satsuma orange pests and its application. 1. Agr. & Hort. 40(2):95-100. In Jap.

Nishino, M., Furuhashi, K. and Matsunaga, Y. 1965. Study on forecasting the occurrence of the arrowhead scale, *Unaspis yanonensis* Kuwana. I. The period and the type of emergence of the 1st generation. Shizuoka. Citrus Expt. Sta. Bul. 5:69-93. Ref. In Jap., Engl. Sum.

Pavlov, I. 1965. Forecasting for some pests. Zashch. Rast. ot Vred. i Boleznei 7:42-43. In Rus. [Scarabaeidae and *Mayetiola destructor* on grain.]

Race, S. R. 1965. Predicting thrips populations on seedling cotton. J. Econ. Ent. 58(5):1013-1014

Stoicheva, L. 1965. Short forecasting of outbreak of main insect pests of field crops. Kolkhoz.-Sovkhoznoe Proizv. Moldavii 2:35-36. In Rus.

Uchida, M., Ushiyama, K. and Ogaki, C. 1965. Studies on forecasting the outbreaks of principal insects and diseases in Satsuma orange orchards. 1. On the larval generation, the annual, local and other variations of arrowhead scale, *Unaspis yanonensis* Kuwana. Kanagawa Hort. Expt. Sta. Bul. 13:33-43, Map. In Jap., Engl. Sum.

Wildbolz, T. 1965. Results of investigations of branch samplings 1964/65. Schweiz. Z. f. Obst- u. Weinbau 101, i. e. 74(3):43-46, map. In Ger.

REARING

Ammah-Attoh, V. 1966. Laboratory rearing of the parasitic stages of *Boophilus decoloratus* (Koch, 1844) on the European rabbit (*Oryctolagus cuniculus*). Nature (London) 210(5031):43-44, 77.

Atallah, Y. H. and Newsom, L. D. 1966. Ecological and nutritional studies on *Coleomegilla maculata* De Geer (Coleoptera: Coccinellidae). I. The development of an artificial diet and a laboratory rearing technique. J. Econ. Ent. 59(5):1173-1179.

Barras, S. J. and Norris, D. M., Jr. 1965. In vitro establishment and development of *Eucosma* sp. larvae from cones of *Pinus resinosa* on an artificial nutrient medium. J. Econ. Ent. 58(5):1033.

Beanlands, G. E. 1966. A laboratory-rearing method for observing adult bark beetles and their developing broods. Canad. Ent. 98(4):412-414.

Belvett, V. B., Sun, R. Y. and Robinson, A. G. 1965. Observations on laboratory rearing of grain aphids (Homoptera: Aphididae). Canad. J. Zool. 43(4):619-622. Ref.

Betz, N. L. 1966. Improved laboratory methods for rearing the boll weevil. J. Econ. Ent. 59(2):374-376.

Biever, K. D. 1965. A rearing technique for the colonization of chironomid midges. Ent. Soc. Amer. Ann. 58(2):135-136.

Broersma, D. B. and Hays, S. B. 1966. Improved methods for mass rearing plum curculio, *Conotrachelus nenuphar*. J. Econ. Ent. 59(1):235-236.

Dadd, R. H. and Mittler, T. E. 1965. Studies on the artificial feeding of the aphid *Myzus persicae* (Sulzer). III. Some major nutritional requirements. J. Insect Physiol. 11(6):717-743. Ref.

David, W. A. L. and Gardiner, B. O. C. 1966. Rearing *Mamestra brassicae* (L.) on semi-synthetic diets. Bul. Ent. Res. 57(1):137-142.

David, W. A. L. and Gardiner, B. O. C. 1965. Rearing *Pieris brassicae* L. larvae on a semi-synthetic diet. Nature (London) 207(4999):882-883. Refs.

David, W. A. L. and Gardiner, B. O. C. 1966. Rearing *Pieris brassicae* (L.) on semi-synthetic diets with and without cabbage. Bul. Ent. Res. 56(3):581-593.

DeLyzer, A. J. 1965. Rearing of woolly pine needle aphid, *Schizolachnus piniradiatae*, viviparae. J. Econ. Ent. 58(5):1021-1022.

Drooz, A. T. 1966. Some effects of rearing density on the biology of the elm spanworm. Canad. Ent. 98(1):83-87.

Ebel, B. H. 1966. Rearing and occurrence of xyelid sawflies on slash and longleaf pines in north Florida (Hymenoptera: Xyelidae). Ent. Soc. Amer. Ann. 59(1):227-229. Refs.

George, B. W. and Ortman, E. E. 1965. Rearing the western corn rootworm in the laboratory. J. Econ. Ent. 58(2):375-377.

Gothilf, S. and Beck, S. D. 1966. Rearing the citrus mealy bug, *Planococcus citri* (Risso), on a defined diet. J. Econ. Ent. 59(2):489-490.

Greenwood, J. A. C. 1965. Rearing *Heliothis armigera* Hubn. Ent. Rec. and J. Variation 77 (7/8):190.

Haeger, J. S. and Provost, M. W. 1965. Colonization and biology of *Opifex fuscus*. Roy. Soc. New Zeal. Trans. Zool. 6(3):21-31. Ref.

Hagen, K. S. and Tassan, R. L. 1965. A method of providing artificial diets to *Chrysopa* larvae. J. Econ. Ent. 58(5):999-1000.

Harris, C. R., Svec. H. J. and Begg, J. A. 1966. Mass rearing of root maggots under controlled environmental conditions: Seed-corn maggot, *Hylemya cilicrura*; bean seed fly, *H. liturata*; *Euxesta notata*; and *Chaetopsis* sp. J. Econ. Ent. 59(2):407-410.

Henneberry, T. J. and Kishaba, A. N. 1966. Pupal size and mortality, longevity, and reproduction of cabbage loopers reared at several densities. J. Econ. Ent. 59(6):1490-1493.

Henson, W. R. 1965. Individual rearing of the larvae of *Neodiprion sertifer* (Geoffroy) (Hymenoptera: Diprionidae). Canad. Ent. 97(7):773-779.

House, H. L. 1965. Effects of vitamin A acetate and structurally related substances on growth and reproduction of *Agria affinis* (Fallen) (Diptera: Sarcophagidae). J. Insect Physiol. 11(7):1039-1045. Ref.

House, H. L. and Barlow, J. S. 1965. The effects of a new salt mixture developed for *Agria affinis* (Fallen) (Diptera: Sarcophagidae) on the growth rate, body weight, and protein content of the larvae. J. Insect Physiol. 11(7):915-918. Ref.

Hughes, R. D. and Woolcock, L. T. 1965. A modification of Johnson's method of rearing aphids for ecological studies. New Zeal. J. Agr. Res. 8(3):728-736.

Kajita, H. 1965. The influences of the horticultural varieties of pumpkin upon the development of *Pseudococcus comstocki* Kuwana. Kyushu Univ. Fac. Agr. Sci. Bul. 22(1):17-21. In Jap., Engl. Sum.

Kamano, S. 1965. Rearing of *Papilio xuthus* larvae on artificial diets. Jap. J. Appl. Ent. & Zool. 9(2):133-135. In Jap.

Kamano, S. and Fukaya, M. 1965. On the successive rearing of rice stem borer on the artificial diets under aseptic conditions. IV. The inbreeding and the rotational breeding of the rice stem borer. Jap. J. Appl. Ent. & Zool. 9(2):89-93. In Jap., Engl. Sum.

Kamburov, S. S. 1966. Methods of rearing and transporting predacious mites. J. Econ. Ent. 59(4):875-877.

Keaster, A. J. and Harrendorf, K. 1965. Laboratory rearing of the southwestern corn borer, *Zeadiatraea grandiosella*, on a wheat germ medium. J. Econ. Ent. 58(5):923-924.

Leonard, D. E. and Doane, C. C. 1965. Rearing gypsy moths in the laboratory. Frontiers Plant Sci. (Conn. Sta.) 18(1):1-8.

Leonard, D. E. and Doane, C. C. 1966. An artificial diet for the gypsy moth, *Porthetria dispar* (Lepidoptera: Lymantriidae). Ent. Soc. Amer. Ann. 59(3):462-464.

Lyon, R. L. and Flake, H. W., Jr. 1966. Rearing Douglas-fir tussock moth larvae on synthetic media. J. Econ. Ent. 59(3):696-698.

Matteson, J. W. 1966. Colonization and mass production of the false wireworm *Eleodes suturalis*. J. Econ. Ent. 59(1):26-27.

Matteson, J. W. and Decker, G. C. 1965. Development of the European corn borer at controlled constant and variable temperatures. J. Econ. Ent. 58(2):344-349. Ref.

Matthews, G. A. 1966. Investigations of the chemical control of insect pests of cotton in central Africa. I.--Laboratory rearing methods and tests of insecticides by application to bollworm eggs. Bul. Ent. Res. 57(1):69-76.

McFarland, N. 1965. Additional notes on rearing and preserving larvae of Macrolepidoptera. Lepidopterists' Soc. J. 19(4):233-236.

McLaughlin, R. E. 1966. Laboratory techniques for rearing disease-free insect colonies: Elimination of *Mattesia grandis* McLaughlin, and *Nosema* sp. from colonies of boll weevils. J. Econ. Ent. 59(2):401-404.

McMorran, A. 1965. A synthetic diet for the spruce budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae). Canad. Ent. 97(1):58-62.

McPherson, J. E. 1966. Notes on the laboratory rearing of *Notonecta hoffmanni* (Hemiptera: Notonectidae). Pan-Pacific Ent. 42(1):54-56.

Meisch, M. V. and Randolph, N. M. 1965. Life-history studies and rearing techniques for the three-cornered alfalfa hopper. J. Econ. Ent. 58(6):1057-1059.

Miskimen, G. W. 1965. Nonaseptic laboratory rearing of the sugarcane borer, *Diatraea saccharalis*. Ent. Soc. Amer. Ann. 58(6):820-823.

Morgan, N. O. 1966. Laboratory propagation of the horn fly. J. Econ. Ent. 59(4):1030.

Mukerji, M. K. and Leroux, E. J. 1965. Laboratory rearing of a Quebec strain of the pentatomid predator, *Podisus maculiventris* (Say) (Hemiptera, Pentatomidae). Phytoprotection 46(1):40-60. Ref.

Nash, R. R. and Tombes, A. S. 1966. Evaluation of five artificial diets for the laboratory rearing of alfalfa weevil larvae. J. Econ. Ent. 59(1):220-221.

Nash, T. A. M., Jordon, A. M. and Boyle, J. A. 1966. A promising method for rearing *Glossina austeni* Newst. on a small scale, based on the use of rabbits' ears for feeding. Roy. Soc. Trop. Med. and Hyg. Trans. 60(2):183-188.

Nayar, J. K. 1966. Method of rearing salt-marsh mosquito larvae in a defined sterile medium. Ent. Soc. Amer. Ann. 59(6):1283-1285.

Neilson, W. T. A. 1965. Culturing of the apple maggot, *Rhagoletis pomonella*. J. Econ. Ent. 58(6):1056-1057.

Nosek, J. 1965. The procedures for rearing ticks. Cesk. Parazitol. 12:331-332. In Cz., Engl. Sum.

O'Dell, T. M. and Rollinson, W. D. 1966. A technique for rearing the gypsy moth, *Porthetria dispar* (L.), on an artificial diet. J. Econ. Ent. 59(3):741-742.

Prins, G. 1965. A laboratory rearing method for the cocoa mirid *Distantiella theobroma* (Dist.) (Hemiptera, Miridae). Bul. Ent. Res. 55(4):615-616

Read, D. C. 1965. Rearing root maggots, chiefly *Hylemya brassicae* (Bouche) (Diptera: Anthomyiidae) for bioassay. Canad. Ent. 97(2):136-141.

Richmond, C. A. and Martin, D. F. 1966. Technique for mass rearing of the pink bollworm by infesting diet medium with eggs. J. Econ. Ent. 59(3):762-763.

Rimando, L. C., Corey, R. A. and Sun, Yun-Pei. 1966. Mass rearing of the western spotted cucumber beetle. J. Econ. Ent. 59(1):230-231.

Rivnay, E. and Meisner, J. 1966. The effects of rearing conditions on the immature stages and adults of *Spodoptera littoralis* (Boisd.) Bul. Ent. Res. 56(4):623-634.

Roberts, R. H. 1966. A technique for rearing the immature stages of Tabanidae (Diptera). Ent. News 77(3):79-82.

Rutledge, L. C. and Ward, R. A. 1965. Notes on some laboratory-reared *Culiseta melanura* (Coquillett). Mosquito News 25(2):219-220.

Sato, Y. 1965. The artificial diet for mass rearing of the tobacco cutworm, *Prodenia litura* Fabricius and the common armyworm, *Leucania separata* Walker. Jap. J. Appl. Ent. & Zool. 9(2):99-106. Ref.

Schmidt, H. E. and Karl, E. 1965. Laboratory rearing of *Phorodon humuli* Schrank in the winter months. Naturwissenschaften 52(13):399. In Ger.

Sevastopulo, D. G. 1965. Rearing *Heliothis armigera* Hbn. Ent. Rec. and J. Variation 77(11):262-263.

Shands, W. A., Shands, M. K. and Simpson, G. W. 1966. Techniques for mass-producing *Coccinella septempunctata*. J. Econ. Ent. 59(4):1022-1023.

Shorey, H. H. and Hale, R. L. 1965. Mass-rearing of the larvae of nine noctuid species on a simple artificial medium. J. Econ. Ent. 58(3):522-524.

Smith, E. H. 1965. Laboratory rearing of the peach tree borer and notes on its biology. J. Econ. Ent. 58(2):228-236. Ref.

Solomon, J. D. 1966. Artificial rearing of the carpenterworm, *Prionoxystus robiniae* (Lepidoptera: Cossidae), and observations of its development. Ent. Soc. Amer. Ann. 59(6):1197-1200.

Spishakoff, L. M. 1966. Laboratory rearing of *Anastrepha serpentina*. J. Econ. Ent. 59(4):1010-1011.

Sterling, W. L. and Adkisson, P. L. 1966. An artificial diet for laboratory cultures of boll weevil larvae and adults. J. Econ. Ent. 59(5):1074-1077.

Sterling, W. L., Wellso, S. G., Adkisson, P. L. and Dorough, H. W. 1965. A cottonseedmeal diet for laboratory cultures of the boll weevil. J. Econ. Ent. 58(5):867-869.

Tanaka, M. and Maeta, Y. 1965. Rearing of some predacious coccinellid beetles by artificial diets. Kurume. Hort. Res. Sta. Bul. Ser. D, 3:17-35.

Tashiro, H. 1966. Improved laboratory techniques for rearing California red scale (*Aonidiella aurantii*) on lemons. J. Econ. Ent. 59(3):604-608.

Vanderzant, E. S. 1965. Axenic rearing of the boll weevil on defined diets: amino acid, carbohydrate, and mineral requirements. J. Insect Physiol. 11(6):659-670. Ref.

Walker, D. W., Alemany, A., Quintana, V., Padovani, F., and Hagen, K. S. 1966. Improved xenic diets for rearing the sugarcane borer in Puerto Rico. J. Econ. Ent. 59(1):1-4.

Wood, D. M. and Davies, D. M. 1966. Some methods of rearing and collecting black flies (Diptera: Simuliidae). Ent. Soc. Ontario Proc. 96:81-90.

Yearian, W. C. and Wilkinson, R. C. 1965. Two larval rearing media for *Ips* bark beetles. Fla. Ent. 48(1):25-27.

Yount, J. L. 1966. A method for rearing large numbers of pond midge larvae, with estimates of productivity and standing crop. Amer. Midland Natur. 76(1):230-238. Ref.

Zlotin, A. Z. 1965. The effect of population density and of chemical treatment of food upon the development of *Ocneria dispar* L. when reared in laboratory conditions. Zool. Zhur. 44(12):1809-1812. Ref. In Rus., Engl. Sum.

Zlotin, A. Z., Lymareva, M. A. and Treml, A. G. 1965. Development of the gypsy moth (*Ocneria dispar* L.) under laboratory conditions when fed on acorns. Zool. Zhur. 44(7):1098-1100. In Rus., Engl. Sum.

EQUIPMENT AND TECHNIQUES

Anderson, J. R. and Poorbaugh, J. H. 1965. Refinements for collecting and processing sticky fly tapes used for sampling populations of domestic flies. J. Econ. Ent. 58(3):497-500.

Andreev, S., Martens, B. and Molchanova, V. 1965. Radioactive tracers and radiation in the control of agricultural pests. Mezhdunar. Sel'skokhoz. Zh. 2:31-34. In Rus.

Ant, H. 1965. A safe packing method for shipping of soft-winged insects. Ent. Z. 75(13):148-149. In Ger. [Plastic bags.]

Asquith, D. 1965. Photography in mite counting. J. Econ. Ent. 58(4):677-678.

Bailey, S. W. and McCabe, J. B. 1965. The detection of immature stages of insects within grains of wheat. J. Stored Prod. Res. 1(2):201-202.

Bay, E. G. and Frommer, S. I. 1965. A littoral dredge for quantitative bottom samples. Calif. Vector Views 12(10):56-57.

Bram, R. A., Saugstad, E. S. and Nyquist, W. E. 1965. Factors influencing sweep-net sampling of alfalfa insects. Ent. Soc. Amer. N. Cent. Br. Proc. 20:126. [Physical and environmental factors affecting *Acyrthosiphon pisum*, *Empoasca fabae*, and *Philaenus spumarius*.]

Burton, R. L. and Cox, H. C. 1966. An automated packaging machine for lepidopterous larvae. J. Econ. Ent. 59(4):907-909.

Burton, R. L., Harrell, E. A., Cox, H. C. and Hare, W. W. 1966. Devices to facilitate rearing of lepidopterous larvae. J. Econ. Ent. 59(3):594-596.

Brydon, H. W. 1965. A sampler for immature flies in poultry droppings. J. Econ. Ent. 58(4):697-699.

Brydon, H. W. and Fuller, R. G. 1966. A portable apparatus for separating fly larvae from poultry droppings. J. Econ. Ent. 59(2):448-452.

Davich, T. B., Hardee, D. D., Cleveland, T. C. and Burt, E. C. 1965. Mass marking boll weevil field populations. J. Econ. Ent. 58(5):1035-1037.

Davies, J. B. 1965. Three techniques for labeling *Culicoides* (Diptera: Heleidae) with radioactive tracers both in the laboratory and in the field. Mosquito News 25(4):419-422. [*Culicoides furens* and *C. barbosai* with P^{32}]

Davis, R. 1965. An apparatus for continuously recording aphid flights from their hosts. J. Econ. Ent. 58(5):1034-1035.

Dowell, F. H. 1965. A heavy-duty power aspirator for collecting large numbers of adult mosquitoes. Mosquito News 25(3):325-327.

Dustan, G. G. 1965. Tagging the oriental fruit moth, *Grapholitha molesta* (Busck) with radioactive phosphorus for flight and dispersal studies. Canad. Ent. 97(8): 810-816.

Dustan, G. G. 1966. Effects of tagging amounts of radioactive phosphorus on adults of the oriental fruit moth, *Grapholitha molesta* (Busck) (Lepidoptera: Tortricidae). Canad. Ent. 98(3):305-311. Ref.

Eastwood, R. and Jamieson, D. 1965. A multiple rearing unit for mosquitoes. Calif. Vector Views 12(3):15-16.

Fatzinger, C. W. and Proveaux, M. T. 1965. Conversion equipment to produce a cyclic environment within constant temperature cabinets. Fla. Ent. 48(4):227-237.

Flint, H. M. and Lahren, C. K. 1966. A paper-bag test cage for use with the tobacco budworm. J. Econ. Ent. 59(6):1540-1541.

Foott, W. H. and Boyce, H. R. 1966. A modification of the leaf-disc technique for acaricide tests. Ent. Soc. Ontario Proc. 96:117-119.

Gast, R. T. 1965. Mass producing artificial diet pellets for adult boll weevils. J. Econ. Ent. 58(5):1024-1025.

Gast, R. T. 1966. A spray technique for implanting boll weevil eggs on artificial diets. J. Econ. Ent. 59(1):239-240.

Gibson, K. E. 1965. A power tool for sampling soil for insects. J. Econ. Ent. 58(4):788-790. [*Tetanops myopaeformis*]

Gouck, H. K. and Schreck, C. E. 1965. An olfactometer for use in the study of mosquito attractants. J. Econ. Ent. 58(3):589-590.

Hamann, U. 1965. Migration cage for *Myzus persicae* Sulzer to simplify the determination of leaf roll virus resistance in potato breeding material in the laboratory. Zuchter 35(3):140-144. In Ger.

Hardee, D. D., Mitchell, E. B., Huddleston, P. M. and Davich, T. B. 1966. A laboratory technique for bioassay of plant attractants for the boll weevil. J. Econ. Ent. 59(1):240-241.

Harrell, E. and Davis, R. 1965. An inexpensive portable suction insect sampler. J. Econ. Ent. 58(4):791-792.

Harrell, E. A., Hare, W. W. and Young, J. R. 1966. A fan for handling live insects. J. Econ. Ent. 59(3):756-758.

Hays, S. B. and Amerson, G. M. 1966. New devices for rearing and handling house flies in the laboratory. J. Econ. Ent. 59(6):1523-1524.

Howell, D. E. and Goodhue, L. D. 1965. A simplified insect olfactometer. J. Econ. Ent. 58(5):1027-1028.

Hughes, P. R., Hunter, R. E. and Leigh, T. F. 1966. A light-weight leaf cage for small arthropods. J. Econ. Ent. 59(4):1024-1025.

Jahn, E., Lippay, H., Weidinger, N. and Schwach, G. 1966. Investigations on the dissemination of the nun moth by tagging with the rare earths. Anz. Schadlingskunde 39(2):17-22. Map. Ref. In Ger., Engl. Sum.

Johns, B. E. 1965. Redesigned mosquito egg separation machine. Mosquito News 25(2):223.

Kloft, W., Holldobler, B. and Haisch, A. 1965. The use of radioactive tracers to determine the nest area of *Camponotus herculeanus* L. and *C. ligniperda* Latr., ants which damage timber. Ent. Expt. et Appl. 8(1):20-26. Ref. In Ger., Engl. Sum.

Knott, C. M., Lawson, F. R. and Hobgood, J. M., Jr. 1966. Oviposition cage for the tobacco budworm and the corn earworm. J. Econ. Ent. 59(5):1290.

Kolyer, J. M. 1965. An inexpensive apparatus for photographing mounted specimens. Lepidopterists' Soc. J. 19(4):212-214.

Kring, J. B. 1966. An aphid flight chamber: Construction and operation. J. Econ. Ent. 59(6):1518-1520.

Lawson, D. E. and Weekman, G. T. 1966. A method of recovering eggs of the western corn rootworm from the soil. J. Econ. Ent. 59(3):657-659.

Lindegren, J. E. 1966. Culture techniques for permanent colonization of *Culiseta incidens* (Thomson) (Diptera: Culicidae). Mosquito News 26(1):63-65.

Lippold, P. C. 1966. An improved tube closure for biological tests. J. Econ. Ent. 59(3):626-628.

Mackauer, M. J. P. and Bisdee, H. E. 1965. Two simple devices for rearing aphids. J. Econ. Ent. 58(2):365-366. [*Acyrthosiphon pisum*]

Mathys, G. 1965. Trapping by suction. Entomophaga 10(3):245-246. In Fr.

Matteson, J. W. 1965. A modified aspirator for collecting small arthropods. J. Econ. Ent. 58(5):1031-1032.

Matteson, J. W. 1966. Flotation technique for extracting eggs of *Diabrotica* spp. and other organisms from soil. J. Econ. Ent. 59(1):223-224.

Mazuranich, P. C. and Cowan, F. T. 1966. A metal cage for rearing grasshoppers. J. Econ. Ent. 59(1):232-234.

McGhehey, J. H. and Nagel, W. P. 1966. A technique for rearing larvae of *Medetera aldrichii* (Diptera: Dolichopodidae). Ent. Soc. Amer. Ann. 59(2):290-292.

Mills, R. B. 1965. Apparatus for studying feeding and oviposition by angoumois grain moth adults. J. Econ. Ent. 58(1):177.

Mills, R. R. 1966. A cockroach rearing cage designed for the collection of oothecae. J. Econ. Ent. 59(2):490-491.

Montoya, E. L. 1965. A squeeze device for detection of larvae of the sorghum midge, *Contarinia sorghicola* (Coquillett). J. Econ. Ent. 58(5):938-940.

Nicholls, C. F. and Berube, J. A. C. 1965. An expandable cage for feeding tests of coccinellid predators of aphids. J. Econ. Ent. 58(6):1169-1170.

Osborn, A. W. and Shipp, E. 1965. An economical method of maintaining adult Diptera. J. Econ. Ent. 58(5):1023.

Peterson, D. M. 1965. A quick method for sex determination of codling moth pupae. J. Econ. Ent. 58(3):576.

Prokopy, R. J. 1966. Artificial oviposition devices for apple maggot. J. Econ. Ent. 59(1):231-232.

Provost, M. W., Lum, P. T. M. and Bourinot, L. M. 1965. A constant-temperature mosquito-rearing apparatus. Ent. Soc. Amer. Ann. 58(6):937-938.

Putman, W. L. 1966. Sampling mites on peach leaves with the Henderson-McBurnie machine. J. Econ. Ent. 59(1):224-225.

Rahalkar, G. W. and Doutt, R. L. 1965. A comparison of procedures for marking adult endoparasitic wasps with P32. J. Econ. Ent. 58(2):278-281. Ref. [*Phanerotoma flavitestacea*]

Raybould, J. N. 1966. Further studies on techniques for sampling the density of African house fly populations. 1. A field comparison of the use of the Scudder grill and the sticky-flytrap method for sampling the indoor density of African house flies. 2. A field comparison of the Scudder grill and the sticky-flytrap method for sampling the outdoor density of African house flies. J. Econ. Ent. 59(3):639-644; 644-648.

Riordan, D. F. 1965. Method for obtaining large numbers of unmated *Aedes aegypti* (L.). Mosquito News 25(1):28-29.

Sparks, A. N. 1966. A microchamber for replicating photophases in diapause studies with the European corn borer. J. Econ. Ent. 59(2):492-493.

Starks, K. J., Callahan, P. S., McMillian, W. W. and Cox, H. C. 1966. A photoelectric counter to monitor olfactory response of moths. J. Econ. Ent. 59(4): 1015-1017.

Stern, V. M., Dietrick, E. J. and Mueller, A. 1965. Improvements on self-propelled equipment for collecting, separating, and tagging mass numbers of insects in the field. J. Econ. Ent. 58(5):949-953.

Taimr, L. and Dlabola, J. 1965. Application of radioactive phosphorus for the marking of leafhoppers in the study of their migration. Sb. Uvti (Ustav Vedeckotech. Inform.) Ochrana Rostlin 1(3):75-83. In Cz., Engl. Sum.

Tanaka, N. 1965. Artificial egging receptacles for three species of tephritid flies. J. Econ. Ent. 58(1):177-178.

Turner, E. C. and Gerhardt, R. R. 1965. A material for rapid marking of face flies for dispersal studies. J. Econ. Ent. 58(3):584-585.

Vail, P. V., Howland, A. F. and Henneberry, T. J. 1966. Fluorescent dyes for mating and recovery studies with cabbage looper moths. J. Econ. Ent. 59(5):1093-1097.

Vockeroth, J. R. 1966. A method of mounting insects from alcohol. Canad. Ent. 98(1):69-70.

Wickman, B. E. 1966. Use of radiography to detect mortality of California flat-headed borers in pine bark. J. Econ. Ent. 59(4):1028-1030.

Wilkinson, R. C. 1965. A method for candling pine sawfly cocoons. J. Econ. Ent. 58(3):587.

Wilkinson, R. S. 1965. On freezing and storing Lepidoptera. Ent. Rec. and J. Variation 77(11):261.

Williams, J. H. 1966. Culture-jar modifications for sampling respiratory environments. J. Econ. Ent. 59(4):1022.

Wilton, D. P. and Travis, B. V. 1965. An improved method for simulated stream tests of blackfly larvicides. Mosquito News 25(2):118-123.

Wood, G. W., McAllan, J. W. and Wasson, W. D. 1965. An improved electronic counting apparatus for use in olfactometers. J. Econ. Ent. 58(6):1166-1167.

Yates, H. O. III and Lewis, W. G. 1965. A new material to secure cage entrances. J. Econ. Ent. 58(4):787-788.

Yinon, U. 1965. A simple technique for obtaining eggs of the khapra beetle (*Trogoderma granarium* Everts). Riv. di Parassitol. 26(2):143-145.

TRAPS

Baggiolini, M. and Stahl, J. 1965. Description of a model light trap for capturing insects. Schweiz. Ent. Gesell. Mitt. 37(3):181-190. In Fr.

Barnes, M. M., Wargo, M. J. and Baldwin, R. L. 1965. New low intensity ultraviolet light trap for detection of codling moth activity. Calif. Agr. 19(10):6-7.

Barnes, S. H. 1965. Supplying electric service for insect traps. Amer. Soc. Agr. Eng. Pap. 306, 7 pp.

Bidlingmayer, W. L. 1966. Use of the truck trap for evaluating adult mosquito populations. Mosquito News 26(2):139-143.

Breeland, S. G. and Pickard, E. 1965. The Malaise trap--an efficient and unbiased mosquito collecting device. Mosquito News 25(1):19-21.

Butler, G. D. 1965. A modified Malaise insect trap. Pan-Pacific Ent. 41(1):51-53.

Butler, G. D. 1966. An insect flight trap for crop areas. J. Econ. Ent. 59(4): 1030-1031.

Davies, J. B. 1966. An evaluation of the emergence or box trap for estimating sand fly (*Culicoides* spp.: Heleidae) populations. Mosquito News 26(1):69-72.

Evans, D. A. and Medler, J. T. 1966. Improved method of using yellow-pan aphid traps. J. Econ. Ent. 59(6):1526-1527.

Foulk, J. D. 1966. A flower-pot emergence trap for *Leptoconops kerteszi*. J. Econ. Ent. 59(1):225-226.

Glick, P. A. and Graham, H. M. 1965. Seasonal light-trap collections of lepidopterous cotton insects in south Texas. J. Econ. Ent. 58(5):880-882.

Harding, W. C., Hartsock, J. G. and Rohwer, G. G. 1966. Blacklight trap standards for general insect surveys recommended by the Entomological Society of America. Ent. Soc. Amer. Bul. 12(1):31-32.

Harrendorf, K. and Keaster, A. J. 1965. A walk-in light trap installation with a moth-beetle separator. J. Econ. Ent. 58(5):1010-1011.

Heath, J. A. 1965. A genuinely portable M. V. light trap. Ent. Rec. and J. Variation 77(10):236-238.

Hibler, C. P. and Olsen, O. W. 1965. A trap for hematophagous Diptera. J. Parasitol. 51(6):1010-1011.

Hoffman, J. D., Lawson, F. R. and Peace, B. 1966. Attraction of blacklight traps baited with virgin female tobacco hornworm moths. J. Econ. Ent. 59(4):809-811.

James, H. G. and Redner, R. L. 1965. An aquatic trap for sampling mosquito predators. Mosquito News 25(1):35-37.

Johnson, A. F. and Pengelly, D. H. 1966. A cone trap for immature black flies (Diptera: Simuliidae) Ent. Soc. Ontario Proc. 96:120.

King, E. W., Pless, C. D. and Reed, J. K. 1965. An automatic sample-changing device for light-trap collecting. J. Econ. Ent. 58(1):170-172.

Lafrance, J. 1965. An automatic device for segregating light-trap insect catches at predetermined time intervals. Canad. J. Plant Sci. 45(3):300-302.

Lowe, R. B. 1966. A portable power and control system for the operation of low-wattage argon lamps used in insect light traps. Canad. Ent. 98(3):241-242.

Maharaj, S. 1965. A new design of trap for collecting the palm weevil, *Rhynchophorus palmarum* (L.). Trop. Agr. (St. Augustine) 42(4):373-375.

Malicky, H. 1965. Field tests of lepidopterous populations with the help of the Jermy light trap, with discussion from the point of view of biocoenosis. Z. Angew. Ent. 56(4):358-377. Ref. In Ger.

Marston, N. 1965. Recent modifications in the design of Malaise insect traps with a summary of the insects represented in collections. Kans. Ent. Soc. J. 38(2): 154-162.

Maxwell, C. W. 1965. Tanglefoot traps as indicators of apple maggot fly activities. Canad. Ent. 97(1):110.

Mesch, H. 1965. Experiences with light traps for the warning service. Beitr. Ent. 15(1/2):139-155. Ref. In Ger., Engl. Sum.

Meszaros, Z. 1965. Study of flight of harmful Pyraustidae with the help of light traps (Lepidoptera). Rovartani Kozlemenyek (n.s.) 18(1/17):199-211. In Hung., Ger. Sum.

Nabiev, O. 1965. Trap for Mediterranean fruit fly. Zashch. Rast. ot Vred. i Boleznei 7:48. In Rus.

Nutt, Ya. 1965. Trap for insects. Zashch. Rast. ot Vred. i Boleznei 7:45. In Rus.

Oatman, E. R. and Roder, E. 1965. A blacklight trap effective for single tree sampling. J. Econ. Ent. 58(4):800-802.

Pienkowski, R. L. and Medler, J. T. 1966. Potato leafhopper trapping studies to determine local flight activity. J. Econ. Ent. 59(4):837-843.

Pruess, K. P. and Pruess, N. C. 1966. Note on a Malaise trap for determining flight direction of insects. Kans. Ent. Soc. J. 39(1):98-102.

Rao, B. S. 1965. A light trap for moths of *Nacoleia diemenalis*. J. Econ. Ent. 58(5):1000-1002.

Siggs, L. W. 1965. More new forest mercury vapour light records. Ent. Rec. and J. Variation 77(2):42-43.

Smith, G. E., Breeland, S. G. and Pickard, E. 1965. The Malaise trap--a survey tool in medical entomology. Mosquito News 25(4):398-400, map.

Snoddy, E. L. and Hays, K. L. 1966. A carbon dioxide trap for Simuliidae (Diptera). J. Econ. Ent. 59(1):242-243.

Standfast, H. A. 1965. A miniature light trap which automatically segregates the catch into hourly samples. Mosquito News 25(1):48-53. Ref.

Stanley, W. W. and Bennett, S. E. 1965. Seasonal abundance of 13 species of moths caught in light traps in Tennessee. Tenn. Acad. Sci. J. 40(4):118-131.

Survey and Detection Operations, PPC. 1966. The use of sticky board traps in insect surveys. USDA Coop. Econ. Ins. Rpt. 16(20):446.

Trpis, M. 1965. Some new notions on the construction of light traps for insects. Biologia (Bratislava) 20(12):901-907. Ref. In Cz., Ger. Sum.

Turnbull, A. L. and Nicholls, C. F. 1966. A "quick trap" for area sampling of arthropods in grassland communities. J. Econ. Ent. 59(5):1100-1104.

Zwick, R. W. and Peifer, F. W. 1965. Observations on the emergence and trapping of male *Pleocoma minor* Linsley with black light and female-baited traps (Coleoptera, Scarabaeidae). Pan-Pacific Ent. 41(2):118-120.

ATTRACTANTS

Allan, P. B. M. 1965. A note or two about sugaring. Ent. Rec. and J. Variation 77(6):161-162.

Allen, D. E. 1965. The origin of sugaring. Ent. Rec. and J. Variation 77(5):117-121. Ref.

Berger, R. S., McGough, J. M. and Martin, D. F. 1965. Sex attractants of *Heliothis zea* and *H. virescens*. J. Econ. Ent. 58(5):1023-1024.

Bornemissza, G. F. 1966. Specificity of male sex attractants in some Australian scorpion flies. Nature (London) 209(5024):732-733.

Burkholder, W. E. and Dicke, R. J. 1966. Evidence of sex pheromones in females of several species of Dermestidae. J. Econ. Ent. 59(3):540-543.

Butt, B. A. and Hathaway, D. O. 1966. Female sex pheromone as attractant for male codling moths. J. Econ. Ent. 59(2):476-477.

Finger, A., Stanic, V. and Shulov, A. 1965. Attracting substance (pheromone) produced by virgin females of *Trogoderma granarium* Everts (Coleoptera, Dermestidae). Riv. di Parassitol. 26(1):27-29.

Fletcher, L. W., O'Grady, J. J., Jr., Claborn, H. V. and Graham, O. H. 1966. A pheromone from male screw-worm flies. J. Econ. Ent. 59(1):142-143.

Graham, H. M., McGough, J. M. and Jacobson, M. 1966. Influence of solvents on effectiveness of sex lure for pink bollworm. J. Econ. Ent. 59(3):761-762.

Hagley, E. A. C. 1965. Tests of attractants for the palm weevil. J. Econ. Ent. 58(5):1002-1003.

Henneberry, T. J. and Howland, A. F. 1966. Response of male cabbage loopers to black-light with or without the presence of the female sex pheromone. J. Econ. Ent. 59(3):623-626.

Jacobson, M. 1965. Insect sex attractants. 154 pp., New York, Ref.

Jacobson, M. and Beroza, M. 1965. American cockroach sex attractant. Science 147(3659):748-749.

Jones, P. A., Coppel, H. C. and Casida, J. E. 1965. Collection of additional sex attractant from the virgin female introduced pine sawfly. J. Econ. Ent. 58(3):465-466.

Knipling, E. F. and McGuire, J. U., Jr. 1966. Population models to test theoretical effects of sex attractants used for insect control. U. S. Dept. Agr., Agr. Inform. Bul. No. 308, 20 pp.

McGovern, T. P., Beroza, M., Ohinata, K., Miyashita, D. and Steiner, L. F. 1966. Volatility and attractiveness to the Mediterranean fruit fly of trimedlure and its isomers and a comparison of its volatility with that of seven other insect attractants. J. Econ. Ent. 59(6):1450-1455.

Mitlin, N., Reily, V. L. and Gast, R. T. 1966. Color preference in the feeding behavior of the boll weevil. J. Econ. Ent. 59(3):598-599.

Nadel, D. J. and Peleg, B. A. 1965. The attraction of fed and starved males and females of the Mediterranean fruit fly, *Ceratitis capitata* Wied., to "Trimedlure." Israel J. Agr. Res. 15(2):83-86.

Poleshchuk, V. D., Dremova, V. P., Volkov, Yu. P. and Zharov, V. V. 1965. On the methods of study attractants. Zhur. Mikrobiol. Epidemiol. i Immunobiol. 8:18-22. Ref. In Rus., Engl. Sum.

Schwartz, P. H., Hamilton, D. W., Jester, C. W. and Townshend, B. G. 1966. Attractants for Japanese beetles tested in the field. J. Econ. Ent. 59(6):1516-1517.

Solomon, J. D. and Morris, R. C. 1966. Sex attraction of the carpenterworm moth. J. Econ. Ent. 59(6):1534-1535.

Vite, J. P. 1965. Applicability of insect produced attractants in forest protection. Forst-Holzwirt 20(5):98-102. In Ger.

Waters, R. M. and Jacobson, M. 1965. Attractiveness of gyplure masked by impurities. J. Econ. Ent. 58(2):370-371.

Whitsel, R. H. and Schoeppner, R. F. 1965. The attractiveness of carbon dioxide to female Leptoconops torrens Tns., and L. kerteszi Kieff. Mosquito News 25(4): 403-410. Ref.

PICTORIAL KEYS

Dekle, G. W. 1965. Illustrated key to caterpillars on corn. Fla. Dept. Agr. Div. Plant Indus. Bul. 4, 14 pp.

Krishna, K. 1966. Key to eight termite genera. USDA Coop. Econ. Ins. Rpt. 16(47): 1091-1098. [Page 1096 replaced by page 1140 in CEIR]

Okumura, G. T. 1966. A supplemental character for separating adult Trogoderma granarium Everts, khapra beetle, from other nearctic Trogoderma species. USDA Coop. Econ. Ins. Rpt. 16(9):147.

Perlstein, J. M. 1965. Pictorial keys to common domestic flies in California. Calif. Vector Views 12(5):21-24.

Smith, D. R. 1966. Recognition of the European apple sawfly and the pear sawfly (Hymenoptera: Tenthredinidae) USDA Coop. Econ. Ins. Rpt. 16(12):228-230.

Prepared in Plant Pest Control
Division February 17, 1966

USDA Coop. Econ. Ins. Rpt.
17(7):97-112

Coope

ECONOMIC [illegible]

REPORT

[illegible] CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
Hyattsville, Maryland 20782

OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF AGRICULTURE

UN02658 AL03001BB2PI 4SB 0001
USDA NAT AGR LIB BELTSVILLE
BR
PLANT INDUS STA
BELTSVILLE MD 20705